IN THE CLAIMS

1. (Original) An optical imaging system for reducing focus-related aberrations induced by an intervening medium, comprising:

optics, including a wavefront coding mask, for imaging a wavefront of the imaging system to an intermediate image and for modifying phase of the wavefront such that an optical transfer function of the optical imaging system is substantially invariant to the focus-related aberrations induced, over time, by the intervening medium;

a detector for detecting the intermediate image; and

a decoder for processing data from the detector to process phase effects induced by the optics to form a final image that is substantially clear of the focus-related aberrations.

2. (Original) The system of claim 1, wherein the aberrations comprise one or more of misfocus, spherical aberration, astigmatism, field curvature, chromatic aberration, temperature induced misfocus aberration, pressure induced misfocus aberration, trefoil and coma.

3. (Original) The system of claim 1, the wavefront coding mask being configured to account for focus-related aberrations defined by Zernike polynomials.

4. (Original) The system of claim 1, the optics comprising one or more optical elements.

5. (Original) The system of claim 4, the wavefront coding mask being integrated with the optical elements.

6. (Original) The system of claim 4, the wavefront coding mask being integrated with one or more surfaces of the optical elements.

7. (Original) The system of claim 4, the optical elements comprising adaptive optics.

8. (Original) The system of claim 7, the adaptive optics comprising the wavefront coding mask.

9. (Original) The system of claim 8, the aberrations comprising one of piston error, quilting error and stuck actuator error.

10. (Original) The system of claim 1, wherein the wavefront coded structure is positioned at one or more of a principal plane of the imaging system, an image of a principal plane of the imaging system, an aperture stop of the imaging system, and an image of the aperture stop.

11. (Original) The system of claim 1, wherein the intermediate image defines a modulation transfer function that has no zeros for detected spatial frequencies of the detector.

12. (Original) The system of claim 11, the decoder operable to restore each detected frequency of the wavefront in the final image.

13. (Original) The system of claim 1, the decoder being space variant to control aberrations comprising coma.

14. (Original) The system of claim 1, the decoder being dynamic to continually produce the final image while the aberrations vary, over time.

15. (Original) A task-based optical imaging system for reducing focus-related aberrations induced by an intervening medium, comprising:

optics, including a wavefront coding mask, for imaging a wavefront of the imaging system to an intermediate image and for modifying phase of the wavefront such that an optical transfer function of the optical imaging system is substantially invariant to the focus-related aberrations induced, over time, by the intervening medium; and

a detector for detecting the intermediate image.

16. (Original) A method for reducing focus-related aberrations induced by a medium through which an optical wavefront propagates while being imaged by an optical system, comprising the steps of:

modifying the wavefront with a phase function to modify an optical transfer function of the optical system such that the optical transfer function at an intermediate image is substantially invariant to focus-related aberrations induced by the medium over time; and

decoding data representative of the intermediate image to remove effects induced by the step of modifying to form a final image that is substantially free of the focus-related aberrations.

17. (Original) The method of claim 16, wherein the step of modifying comprises the step of modifying according to Zernike polynomials which characterize the focus-related aberrations.

18. (Original) The method of claim 16, the medium comprising air, the method being employed within lithography.

19. (Withdrawn) An imaging system for imaging acoustical waves through a medium, comprising:

an encoder for coding a wavefront of the acoustical waves propagating through the medium, the encoder being constructed and arranged to make the wavefront substantially invariant to acoustical aberrations caused by the medium;

an imager for imaging the wavefront; and

a decoder for reversing effects of the encoder coding to produce acoustical sounds substantially free of the aberrations.

20. (Currently Amended) An imaging system for reducing ~~image distortion generated by~~ reflections from a detector, comprising:

optics for imaging electromagnetic energy to the detector; and

tilt optics having a tilt surface that tilts away from a plane perpendicular to the imaged electromagnetic energy, for reflecting back-scattered radiation to an aperture stop of the imaging system.

21. (Original) The system of claim 20, the tilt optics being positioned at the aperture stop.

22. (Original) The system of claim 20, the optics comprising a wavefront coded mask for modifying phase of a wavefront imaged to the detector, and further comprising a post processor for further reducing distortion effects introduced by the reflections.

23. (Currently Amended) The imaging system of claim ~~20~~22, wherein the optics are constructed and arranged for coding the wavefront such that an optical transfer function of the imaging system is modified to be substantially invariant to focus-related aberrations, the post processor being configured to remove effects induced by the wavefront coded mask on the wavefront.

24. (Original) A method for reducing optical distortions within an optical system employing adaptive optics, comprising the steps of:

modifying phase of a wavefront of the optical system; and

post-processing image data of the optical system to remove phase effects induced by the wavefront coding mask, to control one or more of quilting, stuck actuator and piston error.

25. (Original) The method of claim 24, the adaptive optics comprising a multi-segmented mirror.

26. (Original) The method of claim 24, wherein the step of modifying comprises modifying phase such that no zeros exist in a modulated transfer function in the image data.

27. (Withdrawn) An anti-reflection optical imaging system, comprising:

an optical detector; and

an optical phase mask for reducing reflected power from electromagnetic radiation incident upon the optical detector.

28. (Withdrawn) The system of claim 27, the phase mask operable within the system to produce a modulation transfer function, without zeros, for detected spatial frequencies of the optical detector.

29. (Withdrawn) The system of claim 27, further comprising a decoder for post-processing data from the detector to reverse effects induced by the optical phase mask, to generate a final image.

30. (Withdrawn) The system of claim 27, further comprising a prism at an aperture within the system, to further reduce reflected power from the electromagnetic radiation.

31. (Currently Amended) A biometric optical recognition system, comprising:

optics, including a wavefront coding mask, for imaging a wavefront of <u>an</u> object to be recognized to an intermediate image; and

a detector for detecting the intermediate image, wherein a modulation transfer function detected by the detector contains no zeros such that subsequent task based image processing recognizes the object.

32. (Original) The system of claim 31, further comprising a decoder, connected with the detector, for implementing the task based image processing.

33. (Original) The system of claim 32, the decoder operable as an all-pass filter in the frequency domain.

34. (Original) The system of claim 32, the decoder operable as an attenuation filter in the frequency domain for magnifications of one or less.

35. (New) An optical imaging system, comprising:

optics for imaging electromagnetic radiation to a detector;

tilt optics for reflecting back-scattered electromagnetic radiation from the detector to an aperture stop of the imaging system; and

a post processor for processing data from the detector to remove aberrations induced by the tilt optics.

36. (New) The system of claim 35, the tilt optics being positioned at an aperture stop.

37. (New) The system of claim 35, the optics comprising a wavefront coded mask for modifying phase of a wavefront imaged to the detector, the post processor configured to remove effects induced by the wavefront coded mask.

38. (New) The system of claim 37, the wavefront coded mask coding the wavefront such that an optical transfer function of the imaging system is substantially invariant to focus-related aberrations.

39. (New) An optical imaging system, comprising:

optics for imaging electromagnetic radiation to a detector, the detector being tilted with respect to an optical axis of the optics to direct back-scattered electromagnetic radiation from the detector to an aperture stop of the imaging system; and

a post processor for processing data from the detector to remove aberrations induced by the tilt of the detector.

40. (New) The system of claim 39, the optics comprising a wavefront coded mask for modifying phase of a wavefront imaged to the detector, the post processor configured to remove effects induced by the wavefront coded mask.

41. (New) The system of claim 40, the wavefront coded mask coding the wavefront such that an optical transfer function of the imaging system is substantially invariant to focus-related aberrations.